

APR 11 2002

ASMEX.320A

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : Pomarede, et al.

Appl. No. : 10/074,722

Filed : February 11, 2002

For : INTEGRATION OF HIGH K  
GATE DIELECTRIC

Examiner : Unknown

) Group Art Unit Unknown

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4/9/02  
(Date)

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PRELIMINARY AMENDMENT

United States Patent and Trademark Office  
P.O. Box 2327  
Arlington, VA 22202

Dear Sir:

Prior to examination, please amend the above-referenced application as follows:

IN THE ABSTRACT:

Please replace the Abstract of the Disclosure with the following new Abstract:

Methods are provided herein for forming electrode layers over high dielectric constant ("high k") materials. In the illustrated embodiments, a high k gate dielectric, such as zirconium oxide, is protected from reduction during a subsequent deposition of silicon-containing gate electrode. In particular, a seed deposition phase includes conditions designed for minimizing hydrogen reduction of the gate dielectric, including low hydrogen content, low temperatures and/or low partial pressures of the silicon source gas. Conditions are preferably changed for higher deposition rates and deposition continues in a bulk phase. Desirably, though, hydrogen diffusion is still minimized by controlling the above-noted parameters. In one embodiment, high k dielectric reduction is minimized through omission of a hydrogen carrier gas. In another embodiment, higher order silanes aid in reducing hydrogen content for a given deposition rate.